

at least one spin rinse dry cell positioned in communication with the mainframe support member;

at least one substrate transfer robot positioned to access the plating cells and the spin rinse dry cell;

a substrate loading station positioned in communication with the mainframe; and

an annealing chamber positioned within reach of the at least one substrate transfer robot.

64. (New) The electrochemical plating system of claim 63, wherein the annealing chamber is positioned in communication with the substrate loading station.

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Cont'd 65. (New) The electrochemical plating system of claim 63, comprising an edge bead removal cell positioned in communication with the mainframe support member.

66. (New) The electrochemical plating system of claim 63, further comprising a chemical replenishment device configured to monitor and dose electrolyte supplied to the at least 2 electrochemical plating cells.

67. (New) The electrochemical plating system of claim 63, wherein the at least one spin rinse dry cell is positioned between the mainframe and the substrate loading station.

REMARKS

This is intended as a full, complete, and timely response to the Office Action dated December 4, 2002, having a shortened statutory period for response set to expire on March 4, 2003. Claims 19 and 20 have been amended and new claims 48-68 have been added to the application. However, Applicants submit that no new matter has been introduced via the above noted amendments, and therefore, entry and consideration of the above noted amendments and the following remarks in response to the Office Action is respectfully requested.

Claims 19 and 20 stand objected to under 37 CFR 1.75(c). The Examiner notes that claim 18, the claim from which claims 19 and 20 depend, has been cancelled from consideration. Therefore, Applicants have amended claims 19 and 20 to depend from claim 1 and respectfully request the Examiner's reconsideration and withdrawal of the objection.

Claims 1-11, 19-22, 24, 26-30, 32, 37-40 and 42-47 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Maydan* (U.S. Patent No. 5,292,393) and *Ting* (U.S. Patent No. 6,187,152), further in view of *Baecker* (U.S. Patent No. 5,820,692). The Examiner takes the position that *Maydan* teaches a multichamber integrated processing system having a mainframe, a loading station, and one or more processing and post processing treatment chambers. However, the Examiner notes that *Maydan* fails to teach that the processing chambers are electroplating stations, and therefore, the Examiner takes the position that *Ting* teaches a multiple processing treatment apparatus that includes one or more electroplating baths and *Baecker* teaches a multichamber apparatus for performing wet and dry processing procedures. Thus, the Examiner concludes that it would have been obvious for one of ordinary skill in the art to have modified the apparatus of *Maydan* to include the electrochemical deposition cells of *Ting*. Applicants traverse the rejection and respectfully submit that the cited combination of references fails to teach each and every element recited within the rejected claims.

Maydan teaches an integrated multiple chamber semiconductor vacuum processing system. The vacuum processing system includes a plurality of processing chambers 16-22 that are each in communication with a central vacuum transfer chamber 14. The vacuum processing chambers are disclosed as being physical vapor deposition (PVD), plasma enhanced chemical vapor deposition (PECVD) chambers, and thermal processing chambers. The vacuum transfer chamber 14 is also in communication with a vacuum load lock chamber 24. However, as the Examiner correctly indicates, *Maydan* fails to teach, show, or suggest that the processing chambers may be electrochemical deposition cells, as recited in Applicants' claims.

Ting teaches a multiple station processing chamber, wherein a substrate may be moved between two or more processing stations within the single processing chamber

and have different wet processes conducted on the substrate at the respective processing stations. Specifically, *Ting* teaches a single processing chamber 10 having a vertically movable substrate support member 16 positioned therein, wherein the substrate support may be vertically moved between at least two processing stations within the chamber 10 to have material deposited on the substrate at the first location and material removed from the substrate at the second location. However, *Ting* does not teach, show, or suggest an integrated ECP system having a plurality of ECP cells on a mainframe that is in communication with a thermal anneal chamber, as recited in Applicants' claims.

Baecker teaches a vacuum processing cluster tool for use in semiconductor processing. The cluster tool includes one or more reduced pressure substrate processing chambers in communication with a central substrate transfer chamber having a robot 11 therein. (See, Figure 1.) At least one of the reduced pressure processing chambers includes a substrate support member that is vertically actuatable between a first processing position and a second processing position, as illustrated in Figures 4 and 5. The first processing position includes sealing a processing volume above the substrate via seal 25, while maintaining reduced pressure in the surrounding volume 18. The second processing position corresponds to when the substrate support member is lowered to a rinsing position, as illustrated in Figure 5, where fluid may be applied to the substrate, while volume 18 is maintained at a reduced pressure. However, *Baecker* fails to teach, show, or suggest an integrated ECP system having a loading station, a plurality of ECP cells positioned on a mainframe, and an annealing chamber position in communication with the mainframe, as recited in Applicants' claims.

Upon review and consideration of the references and the Examiner's Office Action, Applicants respectfully traverse the rejection of claims 1-11, 19-22, 24, 26-30, 32, 37-40 and 42-47 under 35 U.S.C. 103(a). With regard to the rejection of claim 1 alone, Applicants submit that in order to establish a *prima facie* obviousness rejection, the Examiner is required to specifically identify where each claimed element resides in a particular reference, as well as identify the teaching, suggestion, or motivation to combine references when more than one reference is used to teach each of the claimed elements. (See *In re Rinehart*, 531 F. 2d 1048, 189 USPQ 1257 (Fed. Cir. 1984),

wherein the court held that establishment of a prima facie case requires that the combined reference teachings must illustrate each of the claimed elements.) Although this requirement places the burden of establishing the prima facie case of obviousness squarely on the Examiner's shoulders, the courts have routinely held that this requirement is a necessity to maintain an equitable process and to prevent Applicants from "shooting arrows in the dark hoping somehow to hit a secret rejection." (See, *In re Oetiker*, 24 USPQ 2d 1443 (Fed. Cir. 1992), and *In re Dillon*, 16 USPQ 2d 1897 (Fed. Cir. 1990). Applicants have reviewed the Examiner's rejection of claim 1 in the Office Action and submit that the Examiner has not indicated what reference teaches the thermal anneal chamber disposed in connection with the mainframe, as recited in claim 1. In view of the above noted requirements for establishing a prima facie obviousness rejection, Applicants respectfully request withdrawal of the rejection, or the Examiner's clarification of the rejection of claim 1 in a non-final office action to indicate what reference or references are being relied upon to teach each element recited in claim 1, so that Applicants may have the opportunity to properly respond to the Examiner's rejection.

*See
p. 5 of
paper #15
Mayden teaches
thermal anneal*

With regard to the rejection of claims 2-11, 19-22, 24, 26-30, 32, 37-40 and 42-47, Applicants respectfully traverse the rejection on grounds that the Examiner has not properly established a prima facie case of obviousness. To establish a prima facie obviousness rejection, the Examiner must first specifically identify prior art that teaches or suggests each limitation recited in the claims. (See, *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). Second, the examiner must particularly identify a teaching, suggestion, or motivation from within the references to combine the references to generate the claimed invention. (See, *In re Dembiczak*, 50 USPQ2d 1614 (Fed. Cir. 1999)). Third, the teaching of the claimed invention from the prior art must be accompanied by a reasonable expectation of success. (See, M.P.E.P. § 2143, citing *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

In supporting the rejection of claims 1-11, 19-22, 24, 26-30, 32, 37-40 and 42-47 under §103, the Examiner has merely cited a combination of references, wherein each reference is proffered to teach at least one element of Applicants' claims. The Examiner then states that the motivation for combining the references to generate

Applicants claimed invention is a result of each of the cited references being from the same technology area of integrated processing apparatus. However, Applicants submit that the Examiner has not indicated where any of the cited references teach, show, or suggest combining a processing mainframe with an electrochemical plating cell and an annealing chamber. The Examiner has attempted to support the rejection by combining, *Maydan*, which is directed to a vacuum processing cluster tool that may be used for PVD and CVD-type processes, with *Ting*, which is directed to an atmospheric pressure electrochemical plating cell. Applicants submit that there is no teaching or suggestion within any of the cited references to combine the atmospheric pressure electrochemical plating cell of *Ting* into the vacuum processing PVD/CVD system of *Maydan*. Applicants further note that the Examiner's reliance upon the knowledge of one of ordinary skill in the art to provide the motivation to combine the references is misplaced, as case law has directed that the level of skill of one in the art cannot be relied upon to provide the suggestion to combine references, rather, the suggestion must come from the references themselves. (See, M.P.E.P. § 2143.01, citing *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308 (Fed. Cir. 1999)).

Further, Applicants submit that even if the electrochemical plating cell of *Ting* were combined with the CVD/PCD system of *Maydan*, there is no demonstration or expectation of a reasonable likelihood of success evidenced within any of the cited references. Applicants submit that vacuum processing chambers, such as the CVD and PVD chambers of *Maydan*, are a separate and distinct semiconductor processing technology area from electrochemical deposition cells, such as the plating cell of *Ting*. Applicants find no teaching or suggestion within any of the cited references to combine these distinct technology areas into a single processing system. The Examiner has cited to *Baecker* as teaching a fluid processing (rinsing) chamber that is compatible with a vacuum processing system, however, *Baecker* does not provide any teaching, suggestion, or motivation to combine an electrochemical plating cell into a vacuum processing platform. Further, as noted above, Applicants submit that even if the references were properly combinable, the combination would still fail to teach each and every element recited in Applicants' claims.

Therefore, in view of the preceding remarks, Applicants respectfully request reconsideration of the rejection of claims 1-11, 19-22, 24, 26-30, 32, 37-40 and 42-47 under §103. Applicants submit that the references are not properly combinable as a result of a lack of teaching or suggestion to combine the cited references to generate the claimed invention. Further, Applicants submit that there is no reasonable expectation of success if the teaching of the references were to be combined, as the references are from separate and distinct technology areas that are not known to be combinable in the art. Further, Applicants submit that the only teaching or suggestion in the art to combine an electrochemical plating cell and an annealing chamber onto an integrated mainframe is within Applicants specification itself. Therefore, Applicants submit that the Examiner's conclusion that it would have obvious to one of ordinary skill in the art to add an annealing chamber to an ECP system comprises impermissible hindsight reconstruction. Accordingly, reconsideration and withdrawal of the rejection of claims 1-11, 19-22, 24, 26-30, 32, 37-40 and 42-47 under §103 is respectfully requested.

Claims 33-34 and 41 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the *Maydan* combination as applied above, further in view of *Polan*, (U.S. Patent No. 4,568,431). The Examiner has taken the position that the *Maydan* combination of references teaches each limitation recited in claim 33, 34, and 41, less the electrolyte replenishing system. However, the Examiner cites to *Polan* as teaching an electrolyte replenishing system. Applicants traverse the rejection and respectfully submit that the cited combination of references fails to teach, show, or suggest each and every limitation recited in Applicants claims. More particularly, as noted above, Applicants submit that the *Maydan* combination of references is not properly combinable to support a §103 rejection of Applicants claims, as there is no teaching or suggestion to combine the electrochemical plating cell of *Ting* with the vacuum processing platform of *Maydan*. Further, there is no teaching or suggestion of an expectation of success if the references were to be combined. As such, Applicants submit that each of claims 33, 34, and 41 depend from allowable claims (claims 21 and 38), and therefore, Applicants submit that claims 33, 34, and 41 are also allowable. The Examiner's reconsideration of the rejection is respectfully requested.

Claims 23, 25, 31, 35, and 36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the *Maydan* combination discussed above, further in view of *Lloyd* (U.S. Patent No. 6,290,865). The Examiner has taken the position that the *Maydan* combination teaches all of the limitations recited in claim 23, 25, 31, 35, and 36, less the bevel clean cell. However, the Examiner has cited to *Lloyd* as teaching a bevel clean cell for an electrochemical plating system. Applicants traverse the rejection and respectfully submit that the cited combination of references fails to teach, show, or suggest each and every limitation recited in Applicants claims. More particularly, as noted above, Applicants submit that the *Maydan* combination of references is not properly combinable to support a §103 rejection of Applicants claims, as there is no teaching or suggestion to combine the electrochemical plating cell of *Ting* with the vacuum processing platform of *Maydan*. Further, there is no teaching or suggestion of an expectation of success if the references were to be combined. As such, Applicants submit that each of claims 23, 25, 31, 35, and 36 depend from an allowable claim (claims 21), and therefore, Applicants submit that claims 23, 25, 31, 35, and 36 are also allowable. The Examiner's reconsideration of the rejection is respectfully requested.

In sum, with regard to the collective §103 rejections made by the Examiner, Applicants respectfully submit that the Examiner has not presented a proper *prima facie* obviousness rejection. Applicants submit that the references are not properly combinable, as they are from separate and distinct technology areas where technology crossover is both unlikely and unpractical. Further still, Applicants have taken the position that not only is there no teaching or suggestion to combine the cited references, but also that there is no indication that combining the references would be successful. As such, Applicants submit that the only teaching of an electroplating system having an integrated anneal chamber is within Applicants' specification. Therefore, Applicants submit that the Examiner's position that it would have been obvious to add an annealing chamber to an electroplating platform constitutes impermissible hindsight reconstruction.

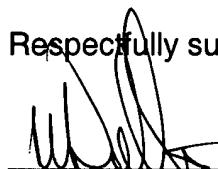
Applicants have added new claims 48-67 in this response. Applicants submit that each of these claims recites features that are neither shown, taught, or otherwise suggested by the cited combination of prior art references. More particularly, each of

the claims 48-68 recite an apparatus or method wherein an electroplating system includes an integrated anneal chamber, which Applicants submit is not shown, taught, or suggested by the cited prior. Applicants further submit that the new method claims submitted herein are properly examined concurrently with the apparatus claims. Accordingly, Applicants request consideration and allowance of claims 48-68.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the method or apparatus of the present invention. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

19. (Amended) The apparatus of claim 1[8], wherein the [one or more] thermal anneal chamber [s] comprises one or more rapid thermal anneal chambers.

20. (Amended) The apparatus of claim 1[8], wherein the [one or more] anneal chamber[s are] is disposed in connection with the mainframe through the loading station.